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(54) IMPROVEMENTS IN AND RELATING TO WASHING MACHINES

(71) We, BRITISH DOMESTIC APPLIANCES LIMITED, of Peterborough, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to domestic clothes washing machines of the non-automatic type incorporating a bowl arranged to contain a liquid washing agent consisting of water in which a soap-powder or other detergent powder has been dissolved, and into which clothes to be washed are arranged to be placed, which bowl also incorporates agitating means such as an impeller or gyrator, for producing a movement of the liquid through the clothes to effect the washing action.

It is important in the washing of clothes that the soap powder or detergent powder, both of which will hereinafter be referred to simply as "the detergent", be adequately dissolved in the water before the washing operation commences otherwise a quantity of undissolved detergent could be deposited on the clothes, which may in some circumstances, cause local bleaching of the fabric. In more expensive washing machines of the type provided with automatic programme controllers for effecting a set sequence of washing operations the detergent may be released gradually into a flowing stream of water entering the bowl of the machine in response to a signal derived from the programme controller, or, alternatively, a signal derived from the programme controller may be utilized to operate a valve to direct a stream of water through a detergent container and thence to the bowl of the machine. These solutions are not applicable to cheaper machines which are not equipped with automatic programme controllers, and it has hitherto been necessary in use of such non-automatic machines to add the detergent by hand to the water in the bowl before a washing operation commences, and preferably before the clothes are placed in the bowl. However this operation is time-consuming and often unsuccessful insofar as the introduction of the detergent into the water in bulk may result in some of the detergent remaining undissolved — particularly when effected immediately prior to the clothes being placed in the bowl as may occur for example when the user of the machine has been previously occupied with some other part of the washing operation. This problem is particularly acute in so-called twin-tub washing machines, that is machines of a composite construction in which the washing machine bowl and the drum of a spin-drying machine are mounted side-by-side within a single cabinet, as a user of such a twin-tub machine is frequently occupied with the loading or unloading of the drum of the spin-drying machine at a time when detergent should be added to the washing machine bowl for a subsequent washing operation.

An object of the present invention is to provide a clothes washing machine of the type referred to, in which the above mentioned disadvantags are substantially avoided.

According to the present invention a clothes washing machine of the type referred to is provided with a dispenser mounted above the normal level of liquid in the bowl and designed to receive a quantity of detergent required to be added to the liquid, the dispenser having an inlet opening and an outlet opening for the passage of liquid through the dispenser, the outlet opening communicating with the bowl and the dispenser being so constructed as to be gradually emptied of the quantity of detergent contained therein by the liquid entering the bowl through the dispenser, and provided with a re-circulating system including a pump and a filter by which liquid is removed from the bowl, filtered, and returned thereto in use of the machine, wherein the return path of the re-circulating system incorporates a passage external to the bowl and communicating with the inlet opening of the dispenser such that at least some of the liquid returns to the

bowl through the dispenser. Preferably, the passage is provided with a manually operated valve through which the washing liquid can be diverted through a waste pipe to a drain, e.g., at the end of a washing operation, to be removed thereby from the bowl instead of being fed back into the bowl.

The gradual introduction of detergent into the washing machine bowl by the flow of liquid avoids the presence of large masses of undissolved detergent in the bowl. The invention has the further advantage that by utilising a dispenser of an appropriate size related to the capacity of the washing machine bowl, or by the provision of a level indicator within the dispenser to indicate when the required amount of detergent has been placed therein, the inadvertent use of an excessive amount of detergent is avoided.

One embodiment of the invention will now be described by way of an example with reference to the accompanying drawings which show a so-called twin-tub washing machine and in which:

Figure 1 is a plan view of a twin-tub washing machine, an access cover to the machine being removed,

Figure 2 is a partial diagrammatic sectional view of the machine shown in Figure 1,

Figure 3 is a partial sectional view on the line III—III in Figure 2, and

Figure 4 is a partial sectional view corresponding to part of Figure 2.

Thus, referring to Figures 1 and 2, a so-called twin-tub, non-automatic clothes washing machine comprises an outer casing 1 in which is mounted a vertically disposed bowl 2 within which an agitator 3 is driven in oscillatory fashion by an electric motor 4 (Figure 2) through a gear-box 5. The casing 1 also contains a spin-drying machine comprising a drum 6 supported within the casing for rotation at a high speed about a vertical axis and also driven by an electric motor, (not shown).

The casing 1 is provided with a console 7 which includes controls for both the washing and the spin drying machines; the control for the spin drying machine will not be described in detail but comprises a safety cut-out switch (not shown) associated with a lid (not shown) for the spin-drying machine and arranged to prevent energisation of the spin-dryer motor when the lid is opened, and a main control switch 8 by means of which a user of the machine may select one of two alternative modes of operation of the spin-dryer.

The controls for the washing section of the machine consist of a timer control knob 9 which enables a user of the machine to set the overall length of a washing operation, and a thermostat 10 for a heating element : not shown) which is mounted within the wash bowl 2 beneath the agitator 3.

Mounted within the console 7 above the wash bowl 2 is a dispenser 11 (shown in section in Figure 3) which comprises a detergent container 12 closeable by a cover 13 hinged to the container, the cover 13 being shown in its opened position by broken lines in Figure 2. The container 12 comprises a lower channel shaped portion having a floor which slopes downwardly from a pipe 14 for water or washing agent entering the dispenser to an outlet 15 to the wash bowl, an an upper portion in the form of a box open at the top and bottom and located within the lower portion with the lower edges of its walls spaced from the floor as shown more clearly in Figure 3 to define a passage for liquid flowing through the dispenser. When the electric motor 4 is energised washing agent is circulated within the washing machine by means of a pump 16 (Figure 2) which removes washing agent from the wash bowl 2 through a pipe 17 which is provided with a filter 18 and returns it thereto through a pipe 19, a valve assembly 20 (which is shown in section in Figure 4), the inlet pipe 14 to the dispenser 11 and the passage provided through the dispenser.

A port 21 (figure 1) is provided in the console 7 adjacent the dispenser 11 into which port a flexible hose for passing washing agent directly into the wash bowl 2 from a tap may be inserted in order to fill the wash bowl.

Washing agent contained in the wash bowl 2 at the end of a washing operation may be extracted by means of the pump 16 through the valve assembly 20 (Figure 4) which is provided with a rubber flap valve 22 which in its normal operative position closes an outlet orifice 23, being held there by the pressure of washing agent within the valve assembly 20 but which may be changed over to its alternative position (shown dotted) by the insertion of a flexible hose 24 (indicated by broken lines) into the orifice 23 which simultaneously closes an outlet orifice 25 communicating with the pipe 14, and in which position washing agent removed from the bowl 2 by the pump 16 passes through the hose 24 to a suitable drain.

Thus, in a normal washing operation, a load of clothes is placed in the wash bowl 2 together with a quantity of water sufficient to fill the bowl to a suitable level, the water being admitted to the bowl by means of a flexible hose inserted in the port 21, and a suitable charge of detergent is poured into the container 12 of the dispenser 11. When the user of the machine desires a washing operation as such to commence, that is subsequent to any soaking and/or heating period, the timer control knob 9 is set to a desired washing period. Operation of the timer causes energisation of the electric motor 4 which drives both the agitator 3 in an oscillatory manner, agitating the clothes in the water, and the pump 16, with the result that water is removed from the bowl 3 through the filter 18 and is circulated through the pipe 19, the valve 20 and the pipe 14, to the dis-

penser 11 where it impinges on the floor of the detergent container 12 and floods under the container before passing into the wash bowl. As the water passes along the floor of the container 12 it effectively 'slices' away the bottom layer of the charge of detergent contained therein carrying it into the washing machine bowl so that the dispenser is gradually emptied of detergent. The resulting violent intermixing of the detergent and the water causes the detergent rapidly to disperse and the resulting washing agent solution passes into the wash bowl. The shape of the side walls of the dispenser container and the relative position of the floor beneath it are such as to prevent water or washing agent wetting the walls of the container as the detergent is carried away so that the walls are left dry for any subsequent load of detergent. Washing agent continues to circulate through the pipes and the dispenser after the dispenser has been emptied of detergent and until the washing operation is completed when it may be pumped away via the hose 24 inserted into the valve 20 (Figure 4).

It will be appreciated that the use of a continuous circulating liquid system permits the inclusion of a soaking and/or a heating period before the detergent is added to the liquid without the use of any form of valve or other means for diverting liquid through the dispenser.

Although the invention is particularly applicable to a 'twin-tub' washing machine where the user may be required to attend to both the spin-dryer and the washing machine at the same time it will be of value in a non-automatic upright washing machine only.

WHAT WE CLAIM IS:—

1. A clothes washing machine of the type referred to provided with a dispenser mounted above the normal level of liquid in the bowl and designed to receive a quantity of detergent required to be added to the liquid, the dispenser having an inlet opening and an outlet opening for the passage of liquid through the dispenser, the outlet opening communicating with the bowl and the dispenser being so constructed as to be gradually emptied of the quantity of detergent contained therein by the liquid entering the bowl through the dispenser, and provided with a re-circulating system including a pump and filter by which liquid is removed from the bowl, filtered, and returned thereto in use of the machine, and wherein the return path of the re-circulating system incorporates a passage external to the bowl and communicating with the inlet opening of the dispenser such that at least some of the liquid returns to the bowl through the dispenser.

2. A clothes washing machine according to Claim 1, wherein said passage is provided with a manually operable valve by which the liquid can be diverted through a waste pipe to a drain, instead of being fed back into the bowl.

3. A clothes washing machine according to Claim 2, wherein the valve is a flap-valve which is normally held closed by the pressure of liquid passing to the dispenser through the recirculating system, but is arranged to be opened by means of a co-operating length of tubing inserted into the valve, the tubing simultaneously closing an outlet orifice to the dispenser and being arranged to divert the liquid to said drain.

4. A clothes washing machine according to any preceding claim which is of a composite construction with the washing machine bowl and the drum of a spin drying machine mounted side-by-side within a single cabinet.

5. A clothes washing machine according to any preceding Claim, wherein the dispenser comprises a box-like container having an opening at the top for the introduction of the detergent, and a floor which slopes downwards towards one end, the inlet opening being located above the floor at the opposite end of the dispenser, and the outlet by which liquid entering the dispenser can pass to the bowl being located at the lower one end of the floor.

6. A clothes washing machine according to Claim 5, wherein the dispenser comprises a lower channel-shaped member incorporating said sloping floor, and an upper portion in the form of a box open at the top and bottom located within the lower portion with its lower edges spaced above the floor of the lower member, such that in use of the machine liquid passing along the floor from the inlet to the outlet openings carries with it a quantity of a charge of detergent placed within the dispenser so as to gradually empty the dispenser of detergent.

7. A clothes washing machine substantially as shown in and as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

For the Applicants,
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1300756 COMPLETE SPECIFICATION
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Sheet 1

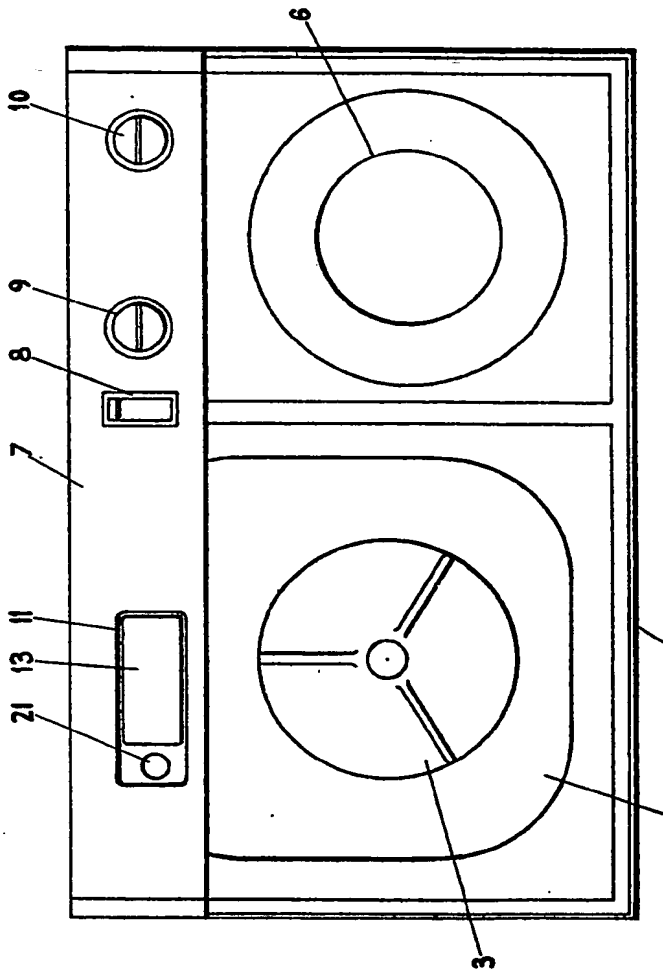

Fig.1

1300756 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

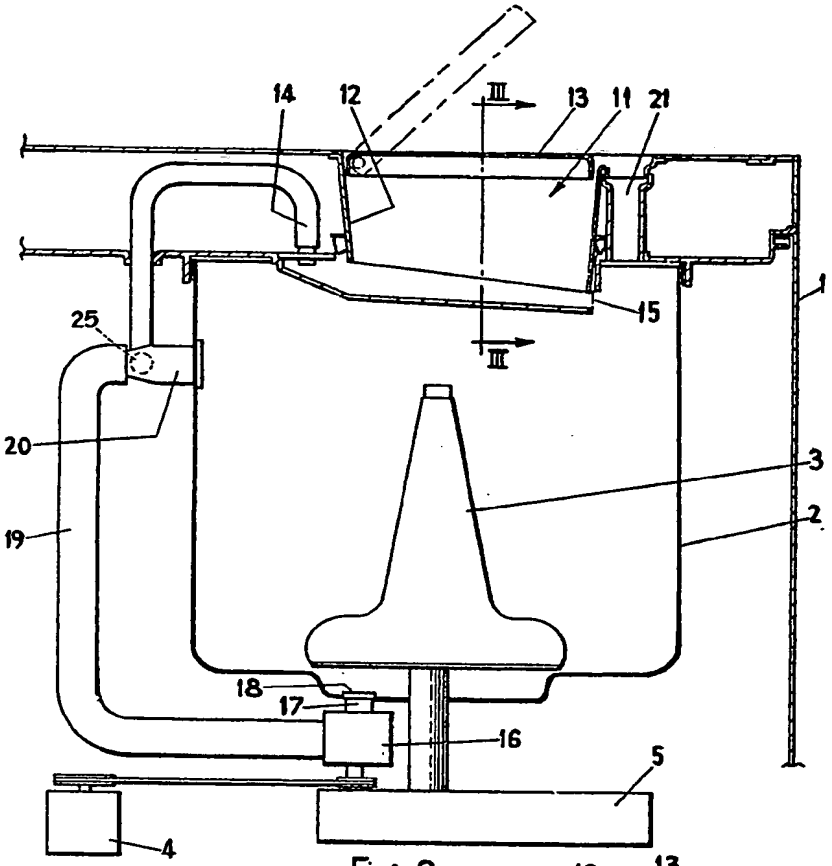

Fig. 2

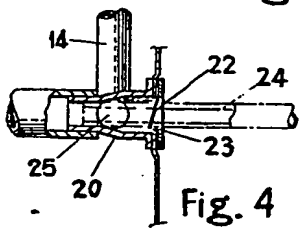

Fig. 4

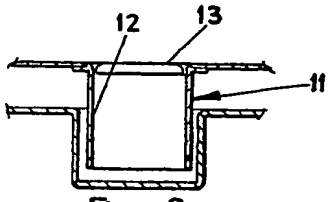

Fig. 3